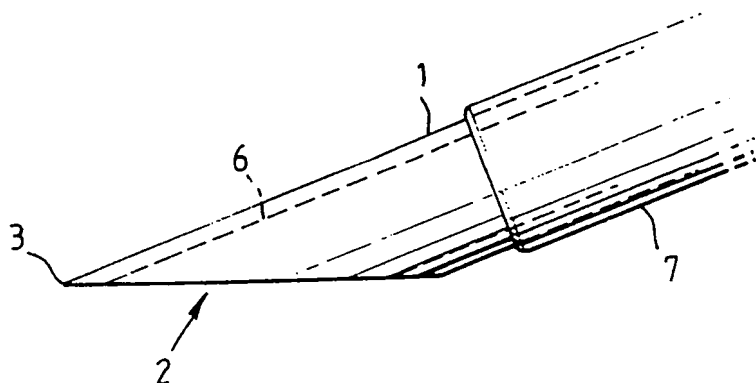


INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

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<p>(21) International Application Number: PCT/NO91/00104</p> <p>(22) International Filing Date: 24 July 1991 (24.07.91)</p> <p>(30) Priority data: 903910 7 September 1990 (07.09.90) NO</p> <p>(71) Applicant (for all designated States except US): PREISS, Otto, T. [NO/NO]; Svartdalsveien 29, N-0393 Oslo 3 (NO).</p> <p>(71)(72) Applicant and Inventor: HEIMREID, Bent [NO/NO]; Junoveien 19, N-3942 Skjelsvik (NO).</p> <p>(74) Agent: HELGERUD, Jan; Bryns Patentkontor A/S, P.O. Box 9566, Egertorget, N-0128 Oslo 1 (NO).</p>		<p>(81) Designated States: AT, AT (European patent), AU, BB, BE (European patent), BF (OAPI patent), BG, BJ (OAPI patent), BR, CA, CF (OAPI patent), CG (OAPI patent), CH, CH (European patent), CI (OAPI patent), CM (OAPI patent), DE, DE (European patent), DK, DK (European patent), ES, ES (European patent), FI, FR (European patent), GA (OAPI patent), GB, GB (European patent), GN (OAPI patent), GR (European patent), HU, IT (European patent), JP, KP, KR, LK, LU, LU (European patent), MC, MG, ML (OAPI patent), MR (OAPI patent), MW, NL, NL (European patent), NO, PL, RO, SD, SE, SE (European patent), SN (OAPI patent), SU*, TD (OAPI patent), TG (OAPI patent), US.</p> <p>Published With international search report. With amended claims.</p>

(54) Title: A CANNULA



(57) Abstract

An intravenous cannula (1) with a bevelled point (2) is designed so as to make the cutting edge (3) of point (2) extend along the portion of the cannula (1) wall which is intended to lie furthest away from the skin (8) in use. The cutting edge (3) is preferably placed along the light opening (6) of cannula (5).

+ DESIGNATIONS OF "SU"

Any designation of "SU" has effect in the Russian Federation. It is not yet known whether any such designation has effect in other States of the former Soviet Union.

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A cannula.

The present invention relates to a cannula, preferably an intravenous cannula of the kind that has a bevelled point forming a cutting edge.

At present, there is a variety of cannulae on the market, however, they only differ in details as regards connection with tubing, medicament wells, and the like.

It is common to all these cannulae that the cutting edge of the cannula is provided along a portion of the cannula circumference and, also, along the portion of the cannula circumference which is intended to lie closest to the skin when in use.

With correct use and correct equipment complications will generally be avoided when, especially peripheral veins are punctured and cannulated, however, some cases of complications or accidents will be unavoidable.

If the cannula is inserted into the vein in a too steep or vigorous manner, there is a hazard of the opposite vein wall being punctured as well. Such a puncture may, in turn, cause blood to ooze from the vein to the tissue with a consequent haematoma.

Also, medicaments may be injected into areas outside the vein in stead of into the blood stream, because the introduced plastic tube is provided adjacent to the unintended place of puncture. Furthermore, the inserted plastic tube may unintentionally be perforated by unintended movement of the cannula in the tube in connection with removal.

Among known technology, we refer to EP 0 238 419 A3 and EP 0 271 775 A3, DE-OS 24 34 618, GP-PS 1 298 707, and US-PS

2 748 769.

All cited documents disclose straight cannulae or cannulae which are slightly arched at the point, with the cutting edge of the cannula extending along the periphery of the cannula tube, and with the cannula, additionally, being equipped with auxiliary openings or with a two-piece cannula opening, this to provide a certain turbulence when injecting.

There are also cannulae on the market the cutting edge of which is displaced by grinding to a point between the periphery and the light opening.

It is an object of the present invention to improve known technology, and the invention, thus, relates to a cannula with a bevelled point which forms a cutting edge, and the cannula is characterized by the fact that the cutting edge of the point extends along the light opening of the cannula in the portion which is placed furthest from the skin when the cannula is inserted.

Experiments proved that the cannula according to the invention results in a smaller penetration or wound area than known cannulae.

This was confirmed in tests on patients, up to 90% of whom said on inquiry that piercing with the cannula according to the invention caused less discomfort than piercing with cannulae of known technology. The tests were made with masked cannulae, one of each kind and one on each arm of the same patient.

Another advantage which is achieved with the cannula according to the invention is that the cannula opening will face the stream when inserted into the vene, which will provide a more rapid "backflow" and, thus, confirmation that the cannula is in place.

Other advantages of the invention will appear from the following disclosure with reference to the accompanying drawings, in which:

- 5 Figure 1 shows a conventional cannula with a cannula tube 1 and a point 2;
- Figure 2 shows an enlarged portion of the point area of Figure 1;
- 10 Figure 3 shows a conventional cannula in a position for penetration;
- Figure 4 shows the situation in case of unintentional penetration of the opposite vene wall;
- 15 Figure 5 shows the unintended situation occurring when the cannula tube is wrongly placed;
- Figure 6 shows an unintentional perforation of the cannula tube by the pont of the cannula;
- 20 Figure 7 shows the general position of the point of the cannula according to the invention (compare with Figure 2);
- 25 Figure 8 corresponds to Figure 3, but shows the invention;
- Figure 9 basically corresponds to Figure 4, but shows the advantage achieved by the invention;
- 30 Figure 10 and
- Figure 11 show a preferred embodiment of the invention (compare with Figure 7);
- 35

Figure 12 shows the preferred embodiment and corresponds to Figure 9;

Figure 13 shows the preferred embodiment and corresponds to Figure 6;

As mentioned above all cannulae on the market at present are of the kind as shown in Figure 1, designed as shown in Figure 2 with the edge of the point being provided in the part of the cannula wall that is intended to lie in contact with the skin when used.

This is diagrammatically shown in Figure 2, and the accidents that may occur when the cannula is used are illustrated in Figures 3 - 6.

In Figure 3 cannula 1 with point area 2 and the associated plastic tube 7 is positioned to penetrate the skin 8 and vene 9 by also piercing one vene wall 9b.

Figure 4 shows what may happen if the cannula is inserted too steeply or forcefully. The opposite vene wall 9c is punctured, which will cause a hazard of blood oozing out of the vene with a consequent haematoma. The patient, thus, must be pierced once more.

In use, blood and medicament may then ooze out of opening 9c, so that there is also an accumulation of liquid outside the vene with further hazard of injuries to tissue and necrosis, see Figure 5.

Figure 6 shows a situation which may occur due to the fact that the point of the cannula is moved inside the cannula tube, the latter may be punctured at 7a.

As mentioned above, it is an object of the invention to remedy the shortcomings of known technology, and according to the general design of the invention this is achieved by

placing the cutting edge 3 of the cannula point 2 along the portion of the cannula wall which is intended to face away from the skin in use.

5 Generally, the cutting edge is achieved by simple angular cutting of the cannula, however it is possible both on conventional cannulae and on cannulae according to the invention to sharpen the cutting cannula edge, as indicated in Figure 2, so as to provide a regular point 4 in stead of
10 the present oval arch.

The cannula according to the invention is illustrated in Figures 8 and 9 with Figure 8 corresponding to Figure 3 immediately before the skin is punctured.

15 In Figure 9 the situation shown is immediately after cannula 1 with plastic tube 7 has penetrated the skin 8 and one vene wall 9a. It will appear that by placing the cutting edge according to the invention a more flat "underside" of the
20 point area 2 is achieved, which will substantially reduce the hazard of puncturing the other vene wall 9b, as shown in Figure 4.

The embodiment shown in Figures 7 - 9 represents an essential
25 improvement as compared to known technology, as illustrated in Figures 3 - 6.

There is, however, a certain though strongly reduced hazard of unintentional penetration of a vene wall upon insertion of
30 the cannula, also in connection with the object of the present invention. This is shown directly in Figure 4, but even after successful insertion a puncture may occur on the side where the point of the cannula is placed.

35 The preferred embodiment of the invention, as mentioned above, should solve this problem too, and this is the case with the embodiment generally shown in Figure 10.

It is achieved by reshaping the point area 2 to move the cutting edge 3 of the cannula from the outer diameter to the inner diameter or light opening, indicated by numeral 6 in Figures 7 and 10.

5

By moving the cutting edge 3 the hazard of unintentionally puncturing the vene wall is substantially reduced, as there is provided a further surface 11 as will appear, e.g. from Figure 12. Said surface may slide against the vene wall preventing the point from getting caught in the vene wall and unintentionally puncturing the wall.

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According to the invention as disclosed above a cannula is achieved in a simple and inexpensive manner, and safety in operation and use is enhanced without sacrificing the safety of known cannulae and, additionally, without causing essentially increased costs.

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The invention, thus, represents an essential improvement as regards operation and use of cannulae in connection with puncturing and cannulation of venes.

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PATENT CLAIM:

A cannula (1) with a bevelled point (2) which forms a cutting
edge (3), c h a r a c t e r i z e d i n that the
5 cutting edge of point (2) extends along the portion of the
light opening (6) of the cannula which, in use, is intended
to be placed furthest away from the skin (8).

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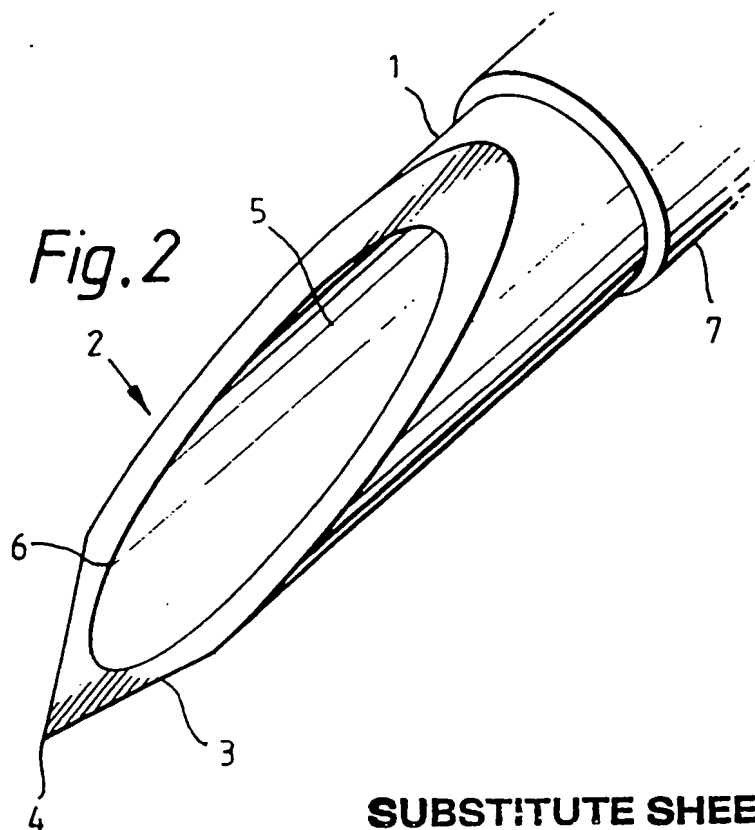
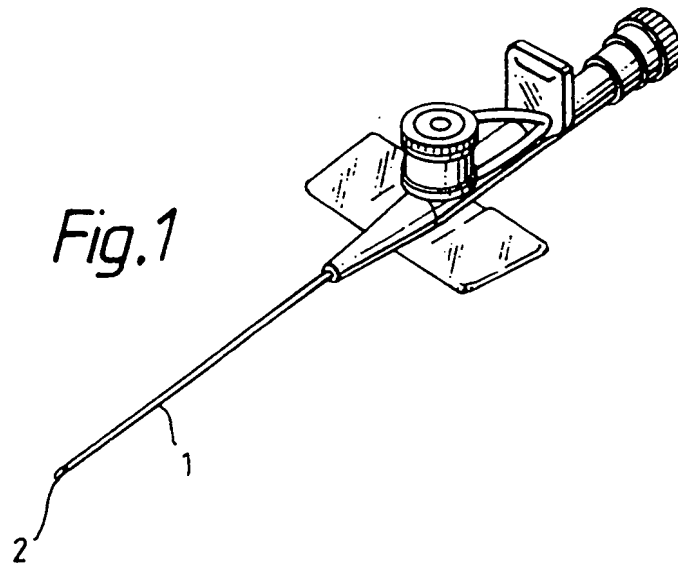
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AMENDED CLAIMS

[received by the International Bureau
on 6 February 1992 (06.02.92);
original claim 1 replaced by amended claim 1
(1 page)]

Cannula (1) with a bevelled point (2) which forms a cutting edge (3), characterized in that the cutting edge (3) of the point (2) extends along the portion of the light opening (6) of the cannula (1) which, before the penetration of the skin (8), is furthest away from the skin (8).



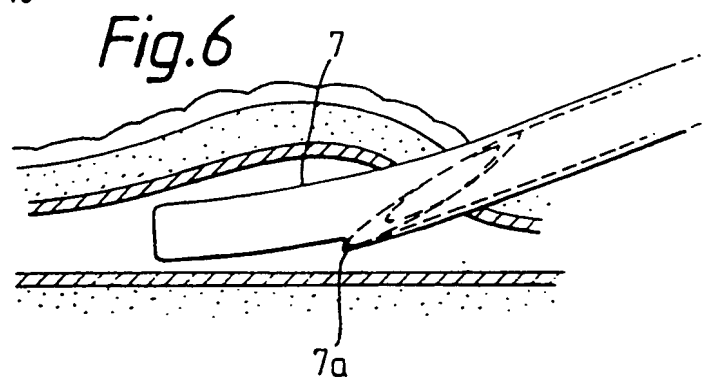
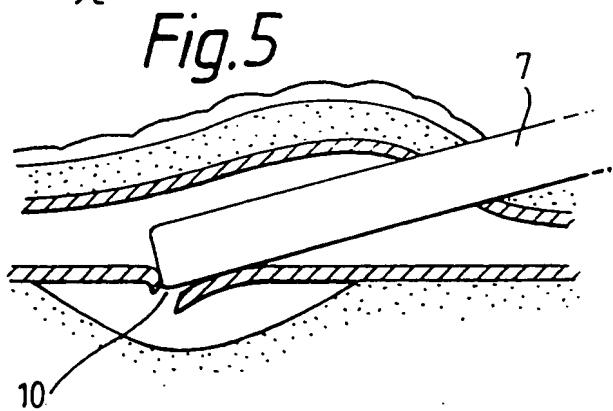
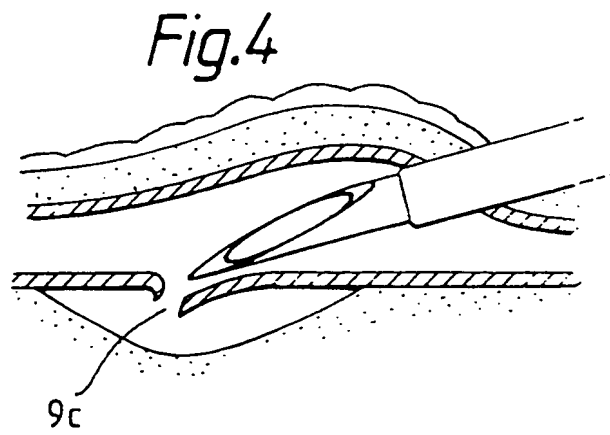
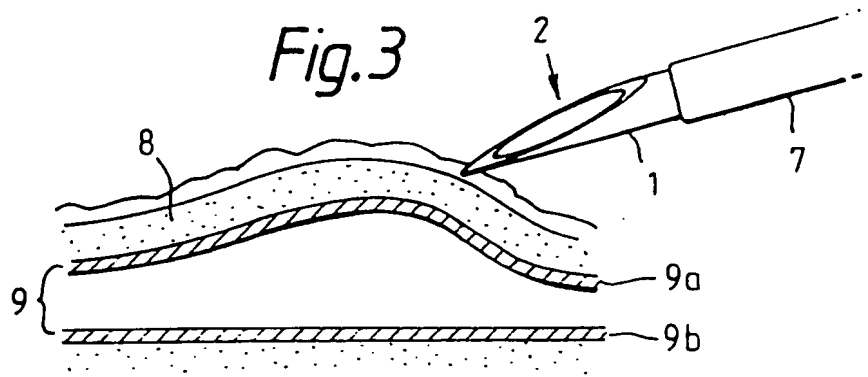


Fig. 7

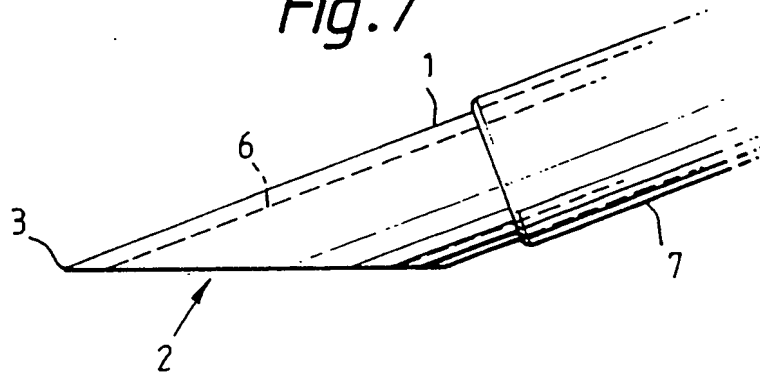


Fig. 8

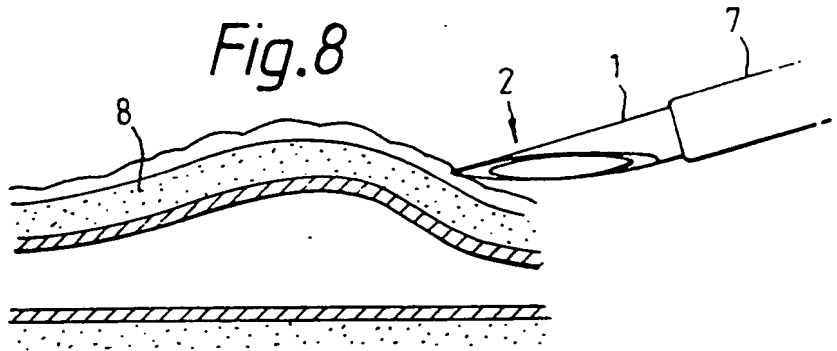


Fig. 9

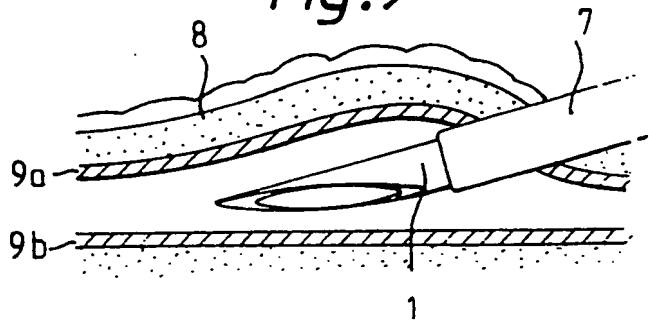


Fig 10

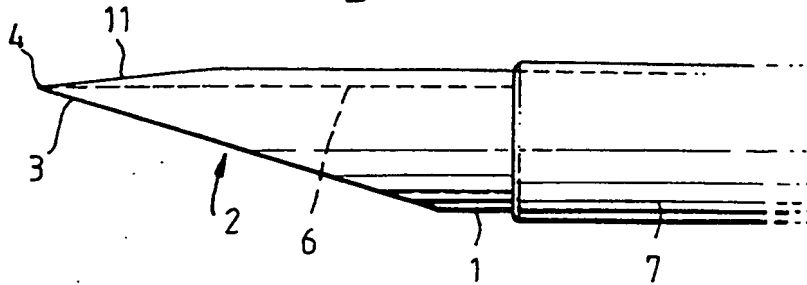


Fig.11

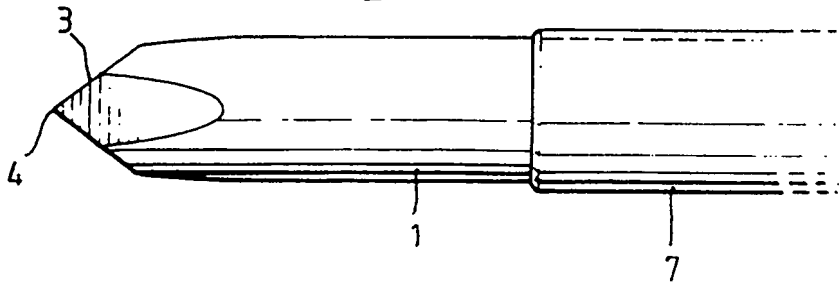


Fig.12

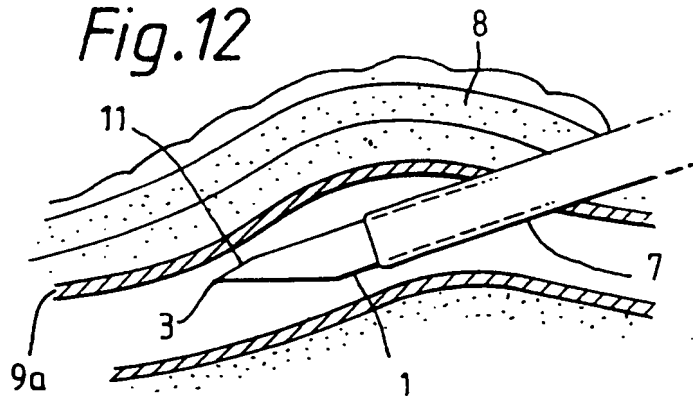
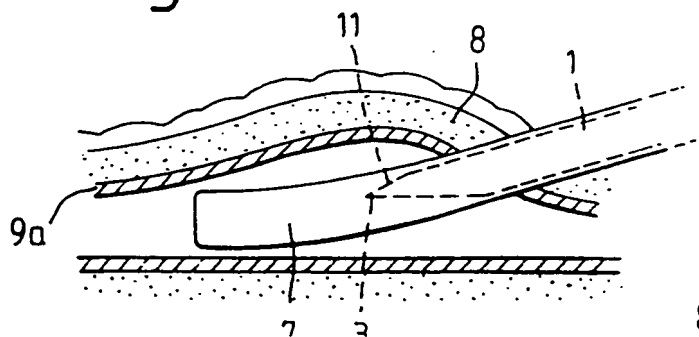


Fig.13



INTERNATIONAL SEARCH REPORT

International Application No PCT/NO 91/00104

I. CLASSIFICATION OF SUBJECT MATTER (if several classification symbols apply, indicate all) ⁵ According to International Patent Classification (IPC) or to both National Classification and IPC IPC5: A 61 M 5/158, 5/32																	
II. FIELDS SEARCHED <div style="text-align: center; border-top: 1px solid black; border-bottom: 1px solid black;">Minimum Documentation Searched⁷</div> <table style="width: 100%; border-collapse: collapse;"> <tr> <th style="width: 25%; border-bottom: 1px solid black;">Classification System</th> <th style="border-bottom: 1px solid black;">Classification Symbols</th> </tr> <tr> <td style="height: 40px; vertical-align: bottom;">IPC5</td> <td style="vertical-align: bottom;">A 61 M</td> </tr> </table> <div style="text-align: center; border-top: 1px solid black; border-bottom: 1px solid black;">Documentation Searched other than Minimum Documentation to the Extent that such Documents are Included in Fields Searched⁸</div> <p style="margin-top: 10px;">SE,DK,FI,NO classes as above</p>			Classification System	Classification Symbols	IPC5	A 61 M											
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IPC5	A 61 M																
III. DOCUMENTS CONSIDERED TO BE RELEVANT⁹ <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 10%; border-bottom: 1px solid black;">Category *</th> <th style="border-bottom: 1px solid black;">Citation of Document,¹¹ with indication, where appropriate, of the relevant passages¹²</th> <th style="width: 10%; border-bottom: 1px solid black;">Relevant to Claim No.¹³</th> </tr> </thead> <tbody> <tr> <td style="text-align: center; vertical-align: top;">X</td> <td style="vertical-align: top;">GB, A, 1298707 (SIEMENS AKTIENGESELLSCHAFT) 6 December 1972, see page 2, line 66 - line 101; figures 1-2 --</td> <td style="text-align: center; vertical-align: top;">1</td> </tr> <tr> <td style="text-align: center; vertical-align: top;">X</td> <td style="vertical-align: top;">DE, C, 346472 (METZ) 31 December 1921, see page 1, line 43 - line 53; figures 1-3 --</td> <td style="text-align: center; vertical-align: top;">1</td> </tr> <tr> <td style="text-align: center; vertical-align: top;">X</td> <td style="vertical-align: top;">US, A, 2524713 (N.P. PLECHAS) 3 October 1950, see figure 1 --</td> <td style="text-align: center; vertical-align: top;">1</td> </tr> <tr> <td style="text-align: center; vertical-align: top;">X</td> <td style="vertical-align: top;">US, A, 4368730 (SHARROCK) 18 January 1983, see figure 7 --</td> <td style="text-align: center; vertical-align: top;">1</td> </tr> </tbody> </table>			Category *	Citation of Document, ¹¹ with indication, where appropriate, of the relevant passages ¹²	Relevant to Claim No. ¹³	X	GB, A, 1298707 (SIEMENS AKTIENGESELLSCHAFT) 6 December 1972, see page 2, line 66 - line 101; figures 1-2 --	1	X	DE, C, 346472 (METZ) 31 December 1921, see page 1, line 43 - line 53; figures 1-3 --	1	X	US, A, 2524713 (N.P. PLECHAS) 3 October 1950, see figure 1 --	1	X	US, A, 4368730 (SHARROCK) 18 January 1983, see figure 7 --	1
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X	US, A, 4368730 (SHARROCK) 18 January 1983, see figure 7 --	1															
<div style="display: flex; justify-content: space-between;"> <div style="width: 48%;"> <p>* Special categories of cited documents:¹⁰</p> <p>"A" document defining the general state of the art which is not considered to be of particular relevance</p> <p>"E" earlier document but published on or after the international filing date</p> <p>"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)</p> <p>"O" document referring to an oral disclosure, use, exhibition or other means</p> <p>"P" document published prior to the international filing date but later than the priority date claimed</p> </div> <div style="width: 48%;"> <p>"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention</p> <p>"X" document of particular relevance, the claimed invention cannot be considered novel or cannot be considered to involve an inventive step</p> <p>"Y" document of particular relevance, the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.</p> <p>"&" document member of the same patent family</p> </div> </div>																	
IV. CERTIFICATION <table style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 50%; border-bottom: 1px solid black; vertical-align: bottom;"> Date of the Actual Completion of the International Search 29th November 1991 </td> <td style="width: 50%; border-bottom: 1px solid black; vertical-align: bottom;"> Date of Mailing of this International Search Report 1991 -12- 06 </td> </tr> <tr> <td style="border-bottom: 1px solid black; vertical-align: bottom;"> International Searching Authority <div style="text-align: center; margin-top: 10px;">SWEDISH PATENT OFFICE</div> </td> <td style="border-bottom: 1px solid black; vertical-align: bottom;"> Signature of Authorized Officer <div style="text-align: center; margin-top: 10px;"> Folke Svensson </div> </td> </tr> </table>			Date of the Actual Completion of the International Search 29th November 1991	Date of Mailing of this International Search Report 1991 -12- 06	International Searching Authority <div style="text-align: center; margin-top: 10px;">SWEDISH PATENT OFFICE</div>	Signature of Authorized Officer <div style="text-align: center; margin-top: 10px;"> Folke Svensson </div>											
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III. DOCUMENTS CONSIDERED TO BE RELEVANT (CONTINUED FROM THE SECOND SHEET)		
Category *	Citation of Document, with indication, where appropriate, of the relevant passages	Relevant to Claim No
X	US, A, 4642101 (KROLIKOWSKI ET AL) 10 February 1987, see column 2, line 60 - column 3, line 3; figures 3-5 --	1
A	SE, C, 135689 (AKTIEBOLAGET STILLE-WERNER) 13 May 1952, see page 2, column 1, line 30 - line 50; figure 3 --	1
A	DE, A, 2005519 (ROESCHEISEN & CO SÜDDEUTSCHE BINDENFABRIK) 28 October 1971, see page 10, line 5 - page 11, line 16; figures 1-2 --	1
A	US, A, 2187259 (G. E. BARNHART) 16 January 1940, see page 2, column 2, line 24 - line 28; figure 3 --	1
A	US, A, 2601580 (B.J. YANUS) 24 June 1952, see column 1, line 52 - column 2, line 4; figures 1,4-5 --	1
A	US, A, 4808170 (THORNTON ET AL) 28 February 1989, see column 3, line 10 - line 28; figures 4-5 -- -----	1

**ANNEX TO THE INTERNATIONAL SEARCH REPORT
ON INTERNATIONAL PATENT APPLICATION NO. PCT/NO 91/00104**

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Patent document cited in search report	Publication date	Patent family member(s)	Publication date
GB-A- 1298707	72-12-06	CH-A- 501410 DE-A-B-C 1927868 FR-A- 2048823	71-01-15 70-12-03 71-03-19
DE-C- 346472	21-12-31	NONE	
US-A- 2524713	50-10-03	NONE	
US-A- 4368730	83-01-18	NONE	
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US-A- 2187259	40-01-16	NONE	
US-A- 2601580	52-06-24	NONE	
US-A- 4808170	89-02-28	NONE	